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(54) Title: REFRIGERATION APPLIANCE

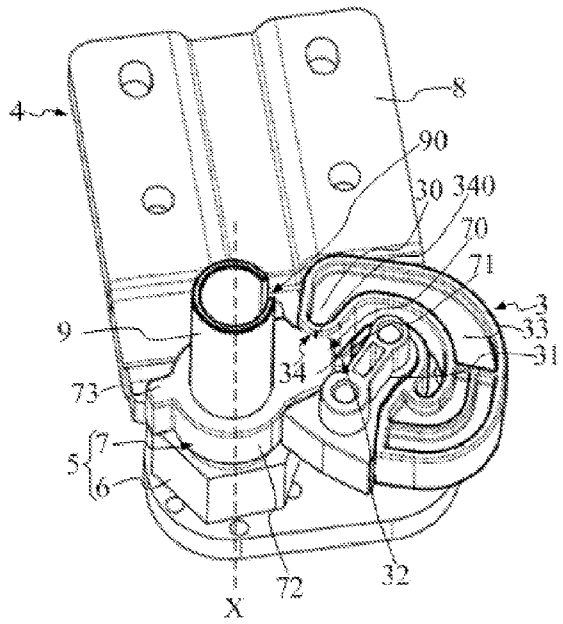

FIG. 3

(57) Abstract: A refrigeration appliance is disclosed, including a cabinet (1), a door (2), a door closer (3), and a hinge assembly (4). The hinge assembly (4) includes an adjusting unit (5), the adjusting unit (5) includes an adjusting member (6) and a supporting member (7) that can be driven by the adjusting member (6) to move along a vertical direction in an adjustment range and support the door (2), and the cabinet (1) is rotatable around the supporting member (7). The supporting member (7) includes a door closing portion (70) for cooperating with the door closer (3) in the following manner: At any height within the adjustment range, the door closing portion (70) and the door closer (3) at least partially overlap in a horizontal direction; when the door (2) is closed, the door closing portion (70) and the door closer (3) cooperate to prevent the door (2) from bouncing away from the cabinet; and the door closing portion (70) is released from the door closer (3) when the door (2) is opened. This technical solution provides a refrigeration appliance that has a small gap above a door (2), has the aesthetic appearance, and is conductive to safe transport.

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REFRIGERATION APPLIANCE

TECHNICAL FIELD

The present invention relates to a refrigeration appliance.

RELATED ART

A refrigerator includes a cabinet, a door, a door closer fixed to the door, and a hinge assembly for connecting the door to the cabinet. The door closer is used to prevent the door from bouncing away from the cabinet after a user closes the door, and release the door when the door is opened. The hinge assembly includes a hinge base and an adjusting unit that is fixed to the hinge base, inserted into an insertion portion of the door, and used to adjust the height of the door relative to the cabinet. The door is rotated around the insertion portion when the door is opened or closed, and the adjusting unit is used to adjust the height of the door.

An existing door closer generally includes two components arranged up and down in a vertical direction, and the two components are meshed by means of sliding to prevent a door from springing open after the door is closed. Therefore, a gap needed by the door closer to slide up and down exists above of the door. On the other hand, an adjustment gap needed by the door to move upward to adjust the height needs to be further reserved above the door. Therefore, the gap for sliding up and down by the door closer and the adjustment gap that are reserved above the door cause a relatively large gap above the door. Especially, for a double-door refrigerator, a relatively large gap exists between upper and lower doors of the double-door refrigerator. This not only affects the aesthetic appearance, but also increases amplitude or probability of movement of the door, which is in-conductive to safe transport of the refrigerator.

SUMMARY

An object of the present invention is to solve at least one technical problem in the prior art, so as to provide a further development to a refrigeration appliance, in particular to provide a refrigeration appliance which is advantageous in appearance aspect and safe transportation as well.

Hence, an aspect of the present invention is related to a refrigeration appliance. The refrigeration appliance includes a cabinet, a door, a door closer fixed to the door, and a hinge assembly for connecting the door to the cabinet, where the hinge assembly includes an adjusting unit for adjusting the height of the door, the adjusting unit includes an adjusting member and a supporting member that can be driven by the adjusting member to move along a vertical direction in an adjustment range and support the door, and the adjusting member is rotatable around the supporting member; characterized in that the supporting member includes a door closing portion for cooperating with the door closer in such manner: at any height within the adjustment range, the door closing portion and the door closer at least partially overlap in a horizontal direction; when the door is closed, the door closing portion and the door closer cooperate to prevent the door from bouncing away from the cabinet; and the door closing portion is released from the door closer when the door is opened.

Compared with the prior art, this technical solution has the following advantages:

The door closing portion and the door closer at least partially overlap in the horizontal direction; and when the door is closed, the door closing portion and the door closer cooperate in the horizontal direction to prevent the door from bouncing away from the cabinet. In this way, the door closer does not move along the vertical direction when the door is closed, and no gap needs to be reserved above the door for the door closer. This reduces a gap above the door, so that the refrigeration appliance has the aesthetic appearance and good stability, and is advantageous for safe transport of the refrigeration appliance. On the other hand, because the door closer cooperates with the door closing portion in the horizontal direction, it is advantageous to reduce the height of a door closing mechanism. Further, the door closing portion for cooperating with the door closer is disposed on the supporting member; therefore, no extra component needs to be added.

Optionally, the supporting member may have a protruding portion protruding outward along the horizontal direction to form the door closing portion, and when the door is closed, the door closing portion is hooked to the door closer to prevent the door from bouncing away from the cabinet. On the one hand, a forming technique of the door closing portion is simple. On the other hand, the door closing portion cooperates with the door closer in a hooking manner when the door is closed, which can maintain stability of the door when the door is closed, and is further advantageous for release of the hooking when the door is opened.

Optionally, the door closing portion may be released from the door closer in a circumferential direction around a rotation axis of the door when the door is opened. The door closer synchronizes with the door, and thus when the door is opened, the door closer may rotate around the rotation axis of the door until the door closer is released from the door closing portion. This release cooperation manner realizes release of the door closer from the door closing portion in the horizontal direction, and the cooperation manner is simple; and the door closer does not have to move along the vertical direction when the door is closed, which is advantageous to reduce the gap above the door.

Optionally, the door closer includes an elastic arm fixed to the door, and when the door is closed, the door closing portion is hooked to the elastic arm. The elastic arm is elastic, therefore, on one hand, the elastic arm is not easily deformed when limited by the door closing portion, to maintain a closed state of the door. On the other hand, when the door is opened, the elastic arm may be pressed by the door closer to have deformation, so as to be released from the door closing portion, so that the door cam be opened relatively smoothly.

Optionally, the door closer further includes a fixing arm through which the elastic arm is fixed to the door, the elastic arm and the fixing arm form a limiting slot therebetween, and the door closing portion is located in the limiting slot when hooked to the elastic arm. The door closing portion is located in the limiting slot and is further limited in two opposite directions by the fixing arm and the elastic arm. The door closing portion effectively restricts the closed state of the door by using the door closer, so that the door is held shut and is prevented from automatically opening.

Optionally, the door closer has a pre-tightening portion for abutting against the door closing portion when the door is closed. When the door is closed, certain friction exists between an upper surface of the door closing portion and the pre-tightening portion, and the friction restricts the closed state of the door, to ensure that the door is held shut, and to prevent the door from freely rotating when the door is closed.

Optionally, the pre-tightening portion may include a stopper wall protruding along the horizontal direction to be disposed above the door closing portion of the door closer. In this case, the stopper wall and the upper surface of the door closing portion are in close contact, and the two are pre-tightening cooperated to a certain extent.

Optionally, the door closer includes an elastic arm fixed to the door, and the door closing portion is hooked to the elastic arm when the door is closed; the stopper wall is formed at a distal end of the elastic arm. The elastic arm is effectively used to implement the stopper wall; therefore, the stopper wall does not need to be independently disposed, and does not occupy much space.

Optionally, a bottom surface of the door faced the hinge assembly is provided with an accommodating slot; and the door closer is accommodated in the accommodating slot. Therefore, the door closer is located in the door in the vertical direction, and basically no gap is formed below the door is thus possible.

Optionally, the door closer is located without going beyond downwardly the bottom surface of the door. Therefore, the door closer is completely located in the door, and no gap is formed below the door, which increase stability of a position of the door.

Optionally, an outer peripheral surface of the supporting member is provided with a lug, and the lug abuts against the door closer after the door is opened, to restrict the door to an extreme position. The lug restricts the extreme position to which the door is opened, to prevent the door from being excessively opened.

Optionally, the hinge assembly further includes a hinge base whose one end is fixed to the cabinet, and a hinge shaft connected to the hinge base and defining the rotation axis of the door; and the supporting member is sleeved on the hinge shaft and the adjusting

member is in a threaded connection with the supporting member, and the adjusting member is rotatable relative to the supporting member to drive the supporting member to support the door to move along the hinge shaft. Such a cooperation manner can be implemented easily.

Optionally, the adjusting member has an internal thread, and the supporting member is inserted into the adjusting member and has an external thread in a threaded connection with the internal thread.

Optionally, one of the supporting member and the hinge shaft has a limiting block protruding towards the other one along a radial direction, the other one is provided with a guide slot that accommodates the limiting block, and the limiting block is moveable in the guide slot along the vertical direction. The limiting block and the guide slot cooperate with each other to prevent rotation of the supporting member, but allow the supporting member to move along the vertical direction. In this way, when the adjusting member rotates, the supporting member can be driven to move along the vertical direction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a three-dimensional view of a refrigeration appliance according to a specific embodiment of the present invention;

FIG. 2 is a partial three-dimensional view of a part of a door of the refrigeration appliance shown in FIG. 1, where the partial three-dimensional view shows a bottom of the door;

FIG. 3 is a schematic view of a position relationship of a hinge assembly and a door closer in the refrigeration appliance shown in FIG. 1 when the door is closed;

FIG. 4 is a schematic view of a position relationship of the hinge assembly and the door closer in the refrigeration appliance shown in FIG. 1 in a process of opening or closing the door;

FIG. 5 is a schematic view of a position relationship of the hinge assembly and the door closer in the refrigeration appliance shown in FIG. 1 when the door is opened; and

FIG. 6 is an exploded view of the hinge assembly in the refrigeration appliance shown in FIG. 1.

DETAILED DESCRIPTION

To make the foregoing objectives, features, and advantages of the present invention more obvious and more understandable, the following describes specific embodiments of the present invention in detail with reference to the accompanying drawings.

Referring to FIG. 1 together with FIG. 2 and FIG. 3, the present invention provides a refrigeration appliance, including a cabinet 1, a door 2, a door closer 3 fixed to the door 2, and a hinge assembly 4 for connecting the door 2 to the cabinet 1, where the hinge assembly 4 includes an adjusting unit 5 for adjusting the height of the door 2, the adjusting unit 5 includes an adjusting member 6 and a supporting member 7 that can be driven by the adjusting member 6 to move along a vertical direction in an adjustment range and support the door 2, and the cabinet 1 is rotatable around the supporting member 7; the supporting member 7 includes a door closing portion 70 for cooperating with the door closer 3; and at any height within the adjustment range, the door closing portion 70 and the door closer 3 at least partially overlap in a horizontal direction; when the door 2 is closed, the door closing portion 70 and the door closer 3 cooperate to prevent the door 2 from springing open; and the door closing portion 70 is released from the door closer 3 when the door 2 is opened (with reference to FIG. 5).

Compared with the prior art, this technical solution has the following advantages: The door closing portion 70 and the door closer 3 at least partially overlap in the horizontal direction; and when the door 2 is closed, the door closing portion 70 and the door closer 3 cooperate in the horizontal direction to prevent the door 2 from bouncing away from the cabinet. In this way, the door closer 3 does not move along the vertical direction when the door 2 is closed, and no gap needs to be reserved above the door 2 for the door closer 3.

This reduces a gap above the door 2, so that the refrigeration appliance has the aesthetic appearance and good stability, and is to conductive to safe transport of the refrigeration appliance.

Referring to FIG. 1, the refrigeration appliance is a side-by-side refrigerator, and the hinge assembly 4 is located at the bottom of the door 2 as a bottom hinge. This is only an example. In another solution, alternatively, the refrigeration appliance is a refrigerator including two doors: an upper door and a lower door, and the hinge assembly 4 is used as an intermediate hinge to connect the upper and lower doors. In this case, the door closer 3 is disposed at the bottom of the upper door.

In this solution, referring to FIG. 2 and FIG. 3, the supporting member 7 has a protruding portion 71 protruding outward along the horizontal direction to form the door closing portion 70, and when the door 2 is closed, the door closing portion 70 is hooked to the door closer 3 to prevent the door 2 from bouncing away from the cabinet. The protruding portion 71 is a protrusion along horizontal direction, does not affect the height of the door 2 along the vertical direction, and does not increase the gap above the door 2.

With reference to FIG. 4 and FIG. 5, the door closing portion 70 is detached from the door closer 3 around a peripheral direction of a rotation axis X of the door 2 when the door 2 is opened. The door closer 3 is fixed to the door 2. First, referring to FIG. 4, the door closer 3 synchronously rotates around the rotation axis X in a process of opening the door 2 (referring to FIG. 1), and at the same time, the door closing portion 70 is fixed. Therefore, the door closing portion 70 gradually disconnects the hooking to the door closer 3 and is released from the door closer 3. Next, referring to FIG. 5, the door closer 3 rotates until the door 2 (referring to FIG. 2) is opened to an extreme position.

In this solution, referring to FIG. 2 and FIG. 3, the door closing portion 70 and the door closer 3 cooperate in a hooking manner to block the door 2 from bouncing away from the cabinet after the door 2 is closed. The door closer 3 includes an elastic arm 30 fixed to the door 2, and when the door 2 is closed, the door closing portion 70 is hooked to the elastic arm 30. The elastic arm 30 is elastic. On the one hand, the elastic arm 30 is not easily deformed when limited by the door closing portion 70, to maintain a closed state of the door 2. On the other hand, when the door 2 is opened, the elastic arm 30 may be

pressed by the door closer 3 to have deformation, so as to release from the door closing portion 70, so that the door 2 is opened relatively smoothly.

Further, the door closer 3 further includes a fixing arm 31 through which the elastic arm 30 is fixed to the door 2, the elastic arm 30 and the fixing arm 31 form a limiting slot 32 therebetween, and the door closing portion 70 is located in the limiting slot 32 when hooked to the elastic arm 30. For example, the door closing portion 70 is located in the limiting slot 32 when the door 2 is closed. In this case, the door closing portion 70 is located in the limiting slot 32 and is further limited in two opposite directions by the fixing arm 31 and the elastic arm 30, and the door closing portion 70 effectively restricts the closed state of the door 2 by using the door closer 3, so that the door 2 is held shut and is prevented from shaking or even from automatically opening. Then, referring to FIG. 4 and FIG. 5, as the door 2 (referring to FIG. 2) is gradually opened, the door closing portion 70 gradually slides out of the limiting slot 32.

Referring to FIG. 2 and FIG. 3, the fixing arm 31 is directly fixedly connected to the door 2, and the fixing arm 31 and the elastic arm 30 are connected together by using a transition segment 33. In this way, the door closer 3 is G-shaped as a whole, and the limiting slot 32 corresponds to an opening of the G-shaped door closer 3.

Next, the door closer 3 has a pre-tightening portion 34 for abutting against the door closing portion 70 when the door 2 is closed. When the door 2 is closed, certain friction exists between an upper surface of the door closing portion 70 and the pre-tightening portion 34, and the friction restricts the closed state of the door 2, to ensure that the door 2 is held shut, and to prevent the door 2 from freely rotating when the door 2 is closed. Specifically, the pre-tightening portion 34 includes a stopper wall 340 protruding in the horizontal direction to be disposed above the door closing portion of the door closer 3. For example, the door closer 3 includes an elastic arm 30, and the stopper wall 340 is disposed at a distal end and of the elastic arm 30 and is located in the limiting slot 32.

Further, the stopper wall 340 extends in the entire the elastic arm 30 in the shape of a strip; or even extends to the fixing arm 31, and extends, from the fixing arm 31 to the limiting slot 32, to the top of the door closing portion 70, which may better maintain stability of the closed state of the door 2.

Referring to FIG. 2, a bottom surface 20 of the door 2 faced the hinge assembly 4 (referring to FIG. 1) is provided with an accommodating slot 21; and the door closer 3 is accommodated in the accommodating slot 21. In this way, the door closer 3 is accommodated in the door 2 in the vertical direction, and basically, no gap is formed below the door 2. Further, the door closer 3 may be located in such way that it does not exceed downwardly the bottom surface 20 of the door 2. In this way, the door closer 3 may be completely located in the door 2, and it is possible that no gap is formed below the door 2, which may increase stability of a position of the door 2.

Referring to FIG. 3 to FIG. 5, an outer peripheral surface 72 of the supporting member 7 is provided with a lug 73, and the lug 73 abuts against the door closer 3 after the door 2 is opened, to restrict the door 2 to an extreme position, which prevents the door 2 from being excessively opened. Referring to FIG. 4, in a processing of opening the door 2 (referring to FIG. 2), the door closer 3 rotates to the lug 73 around supporting member 7. Referring to FIG. 5, when the door closer 3 rotates to abut against the lug 73 along the peripheral direction, the door 2 cannot be further opened.

Referring to FIG. 3 and FIG. 6 together with FIG. 2, a solution of adjusting the height of the door 2 in the refrigeration appliance in this solution is:

The hinge assembly 4 further includes a hinge base 8 whose one end is fixed to the cabinet 1, and a hinge shaft 9 connected to the hinge base 8 and restricting the rotation axis X of the door 2; the supporting member 7 is sleeved on the hinge shaft 9 and the adjusting member 6 is in a threaded connection with the supporting member 7, and the adjusting member 6 is rotatable relative to the supporting member 7 to drive the supporting member 7 to support the door 2 to move along the hinge shaft 9. In the accommodating slot 21 in the bottom surface 20 of the door 2, a bottom wall of the accommodating slot 21 is provided with a blind hole 210 for insertion by the hinge shaft 9.

In this solution, the adjusting member 6 has an internal thread 60, and the supporting member 7 is inserted into the adjusting member 6 and has an external thread 74 in a threaded connection with the internal thread 60. The adjusting member 6 is set to be located on an upper surface of the hinge base 8 and is prevented from moving in the

vertical direction, and the supporting member 7 is set to have a gap with the hinge base 8 in the vertical direction and is prevented from to rotation. In this case, if the adjusting member 6 is rotated, rotation of the adjusting member 6 is converted into vertical movement of the supporting member 7 by means of threaded cooperation. Rotation of the adjusting member 6 along two opposite directions enables the supporting member 7 and the door 2 to move upward along the hinge shaft 9 in two opposite directions.

To prevent rotation of the supporting member 7, one of the supporting member 7 and the hinge shaft 9 has a limiting block 75 protruding towards the other one along a radial direction, the other one is provided with a guide slot 90 that accommodates the limiting block 75, and the limiting block 75 is moveable in the guide slot 90 along the vertical direction. In this solution, the supporting member 7 includes a hole 76, the hinge shaft 9 passes through the hole 76, the limiting block 75 is disposed on an internal hole wall of the hole 76, and the guide slot 90 is provided on an outer peripheral surface of the hinge shaft 9. In an initial state, the limiting block 75 is located in the guide slot 90. The limiting block 75 is blocked by two side walls of the guide slot 90, so that the supporting member 7 cannot rotate with respect to the hinge shaft 9, but the guide slot 90 allows the limiting block 75 to move along the vertical direction, so that the supporting member 7 can move vertically. The hinge shaft 9 is hollow, and the guide slot 90 is through a side wall of the hinge shaft 9. This is only an example, and in another solution, the guide slot may not be through the side wall of the hinge shaft.

In an improvement, alternatively, the guide slot is provided on an inner peripheral surface of the supporting member, and the limiting block is disposed on the outer peripheral surface of the hinge shaft.

Although the present invention is disclosed above, the present invention is not limited thereto. Any person skilled in the art may make various changes and modifications without departing from the spirit and the scope of the present invention. Therefore, the protection scope of the present invention shall fall within the scope limited by the claims.

CLAIMS

What is claimed is:

1. A refrigeration appliance, comprising a cabinet (1), a door (2), a door closer (3) fixed to the door (2), and a hinge assembly (4) for connecting the door (2) to the cabinet (1), wherein the hinge assembly (4) comprises an adjusting unit (5) for adjusting the height of the door (2), the adjusting unit (5) comprises an adjusting member (6) and a supporting member (7) that can be driven by the adjusting member (6) to move along a vertical direction in an adjustment range and support the door (2), and the adjusting member (6) is rotatable around the supporting member (7);
characterized in that the supporting member (7) comprises a door closing portion (70) for cooperating with the door closer (3); and
at any height within the adjustment range, the door closing portion (70) and the door closer (3) at least partially overlap in a horizontal direction; when the door (2) is closed, the door closing portion (70) and the door closer (3) cooperate to prevent the door (2) from bouncing away from the cabinet (1); and the door closing portion (70) is released from the door closer (3) when the door (2) is opened.

2. The refrigeration appliance according to claim 1, characterized in that the supporting member (7) has a protruding portion (71) protruding outward along the horizontal direction to form the door closing portion (70), and when the door (2) is closed, the door closing portion (70) is hooked to the door closer (3) to prevent the door (2) from bouncing away from the cabinet (1).

3. The refrigeration appliance according to claim 1, characterized in that the door closing portion (70) is released from the door closer (3) in a circumferential direction around a rotation axis (X) of the door (2) when the door (2) is opened.

4. The refrigeration appliance according to claim 1, characterized in that the door closer (3) comprises an elastic arm (30) fixed to the door (2), and when the door (2) is closed, the door closing portion (70) is hooked to the elastic arm (30).

5. The refrigeration appliance according to claim 4, characterized in that the door closer (3) further comprises a fixing arm (31) through which the elastic arm (30) is fixed to the door (2), the elastic arm (30) and the fixing arm (31) form a limiting slot (32) therebetween, and the door closing portion (70) is located in the limiting slot (32) when hooked to the elastic arm (30).

6. The refrigeration appliance according to claim 1, characterized in that the door closer (3) has a pre-tightening portion (34) for abutting against the door closing portion (70) when the door (2) is closed.

7. The refrigeration appliance according to claim 6, characterized in that the pre-tightening portion (34) comprises a stopper wall (340) protruding along the horizontal direction to be disposed above the door closing portion (70)of the door closer (3).

8. The refrigeration appliance according to claim 7, characterized in that the door closer (3) comprises an elastic arm (30) fixed to the door (2), and the door closing portion (70) is hooked to the elastic arm (30) when the door (2) is closed; the stopper wall (340) is formed at a distal end of the elastic arm (30).

9. The refrigeration appliance according to claim 1, characterized in that a bottom surface (20) of the door (2) faced to the hinge assembly (4) is provided with an accommodating slot (21); and
the door closer (3) is accommodated in the accommodating slot (21).

10. The refrigeration appliance according to claim 9, characterized in that the door closer (3) is located without beyond downwardly the bottom surface (20) of the door (2).

11. The refrigeration appliance according to claim 1, characterized in that an outer peripheral surface (72) of the supporting member (7) is provided with a lug (73), and the lug (73) abuts against the door closer (3) after the door (2) is opened, to restrict the door (2) to an extreme position.

12. The refrigeration appliance according to any one of the preceding claims, characterized in that the hinge assembly (4) further comprises a hinge base (8) whose one end is fixed to the cabinet (1), and a hinge shaft (9) connected to the hinge base (8) and defining the rotation axis (X) of the door (2); the supporting member (7) is sleeved on the hinge shaft (9) and the adjusting member (6) is in a threaded connection with the supporting member (7), and the adjusting member (6) is rotatable relative to the supporting member (7) to drive the supporting member (7) to support the door (2) to move along the hinge shaft (9).

13. The refrigeration appliance according to claim 12, characterized in that the adjusting member (6) has an internal thread (60), and the supporting member (7) is inserted into the adjusting member (6) and has an external thread (74) in a threaded connection with the internal thread (60).

14. The refrigeration appliance according to claim 12, characterized in that one of the supporting member (7) and the hinge shaft (9) has a limiting block (75) protruding towards the other one along a radial direction, the other one is provided with a guide slot (90) that accommodates the limiting block (75), and the limiting block (75) is moveable in the guide slot (90) along the vertical direction.

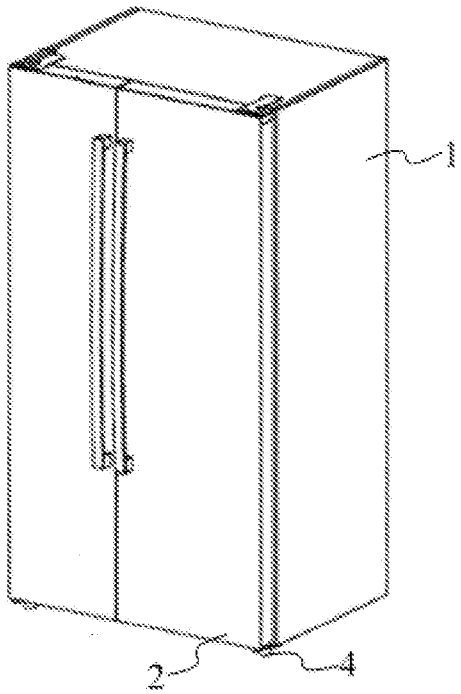

FIG. 1

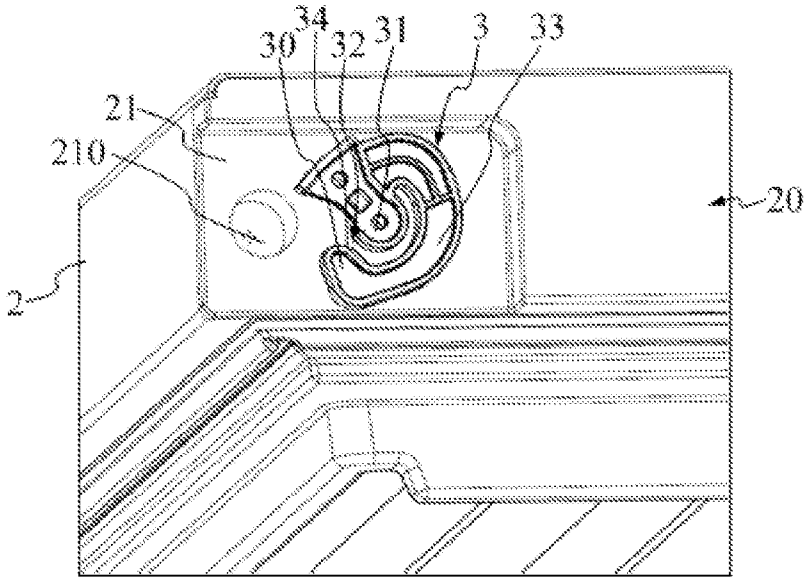

FIG. 2

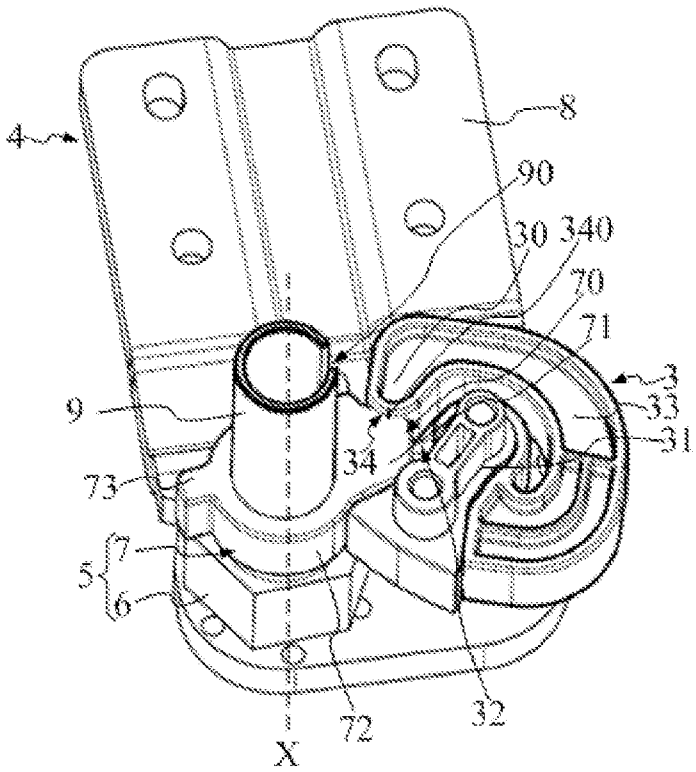

FIG. 3

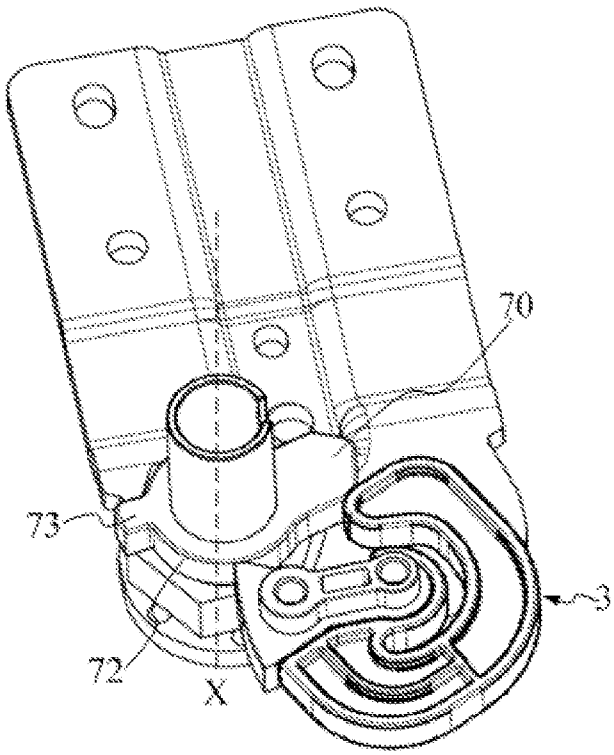

FIG. 4

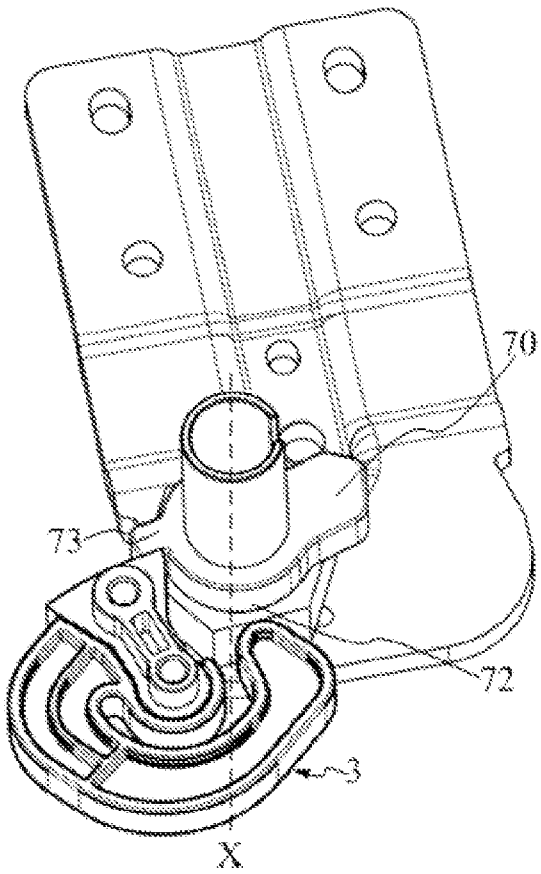

FIG. 5

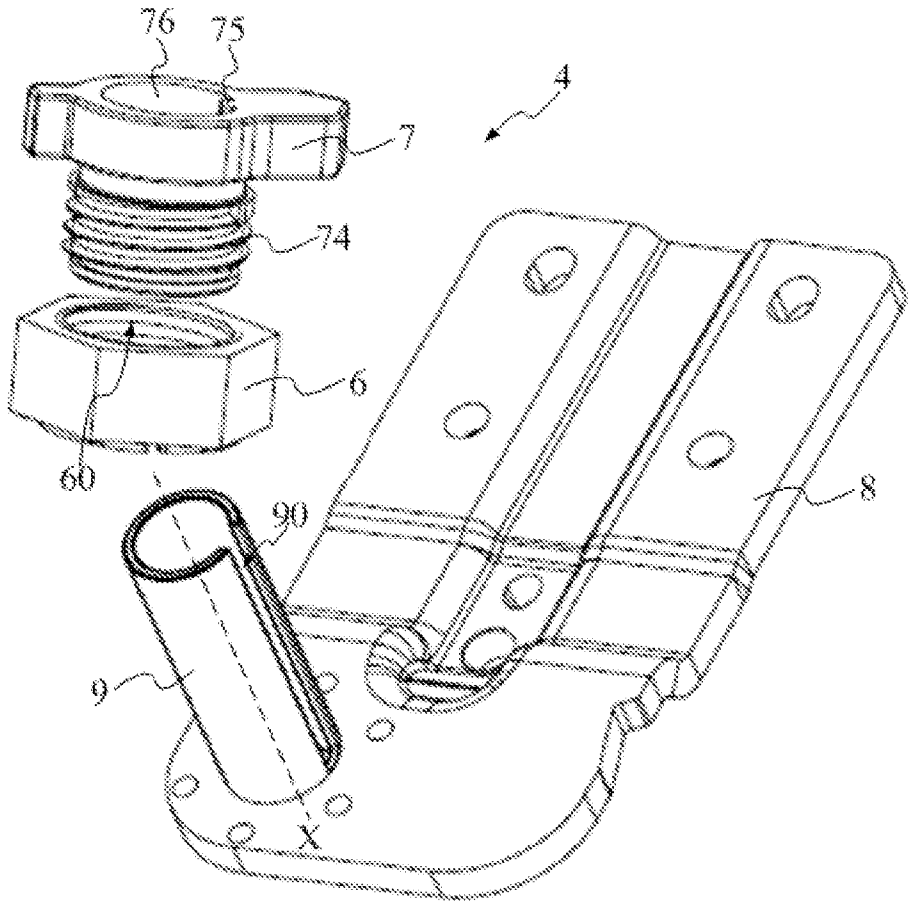

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/057637

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25D23/02 E05D7/00 E05D11/10
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F25D E05D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	EP 2 770 284 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 27 August 2014 (2014-08-27) paragraphs [0062] - [0067]; figures -----	1-10,12, 13 11,14
Y	DE 89 03 458 U1 (BSH GMBH) 18 May 1989 (1989-05-18) figure 3 -----	11
Y	EP 1 679 481 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 12 July 2006 (2006-07-12) figure 5 -----	14
X,P	WO 2016/012577 A1 (BSH HAUSGERÄTE GMBH [DE]) 28 January 2016 (2016-01-28) abstract; figures -----	1
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 February 2017	16/02/2017

Name and mailing address of the ISA/	Authorized officer
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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/057637

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 2 650 626 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 16 October 2013 (2013-10-16) the whole document	1-14
A	JP 2004 301457 A (TOSHIBA CORP) 28 October 2004 (2004-10-28) abstract; figures	1-14
A	WO 03/018945 A1 (ARCEL K A [TR]; OEZYUEKSEL EMRE [TR]; MUTLU SUNAY [TR]) 6 March 2003 (2003-03-06) the whole document	1-14

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2016/057637

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